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⑤④ **A device for scanning the menus of a telephone set.**

⑤⑦ The invention relates to a device for scanning the menus of a telephone set. The device essentially comprises according to the invention a finger actuated rolling means and elements (4, 5) which detect and transform the direction and speed of rotation of the finger actuated rolling means into control signals (N, S) which are conducted to a processor (6) controlling the menus. The device is advantageously used in cellular telephones.

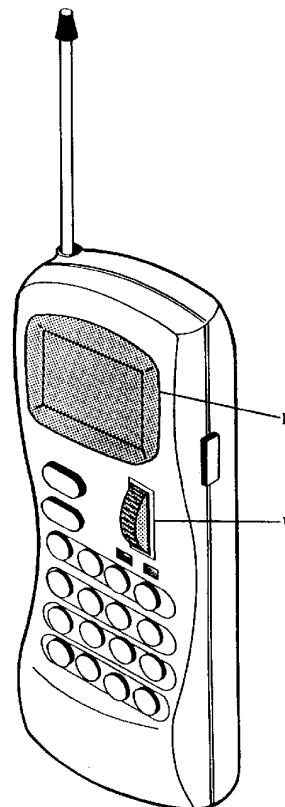


FIG. 1

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The invention relates generally to telephones, and more particularly, to hand-held phones with a display.

Present mobile and cellular telephones widely use microprocessors which control the operation of the set. The interaction between the user and the telephone set is effected through the display and the keypad. The microprocessor writes out menus on the display, and the user may choose the necessary procedures with the aid of the instructions on the menus, and give the microprocessor commands via the keys. The menus can comprise, for example, the instructions for using different functions, an abbreviated dialing memory and contact and other information assembled by the telephone.

The size of the display is limited, thus the user must be able to scan the menu pages preferably both forward and backwards. For this purpose two keys are used, of which one is used to scan the menus forward and the other one is used to scan the menus backwards. In this case the scanning rate can be arranged to be modifiable so that when the key is pressed, a certain delay first occurs before the next menu page appears on the display. By pressing the key permanently the scanning rate can be increased. In this case the delays and the scanning rate generally are pre-defined.

Distinct and reliable operation is required of a telephone set, especially when it is used by a person driving a car. However, the scanning of the menus with the aid of two keys is thus not always sufficiently clear and simple. On the other hand, portable telephones in particular, are expected to be compact and lightweight, whereby the use of two buttons presents a certain limitation because two keys of sufficiently large size have to be fitted in the keypad or in its proximity.

The object of the present invention is to provide a device for scanning the menu of a telephone set which is compact and simple to use.

The solution to this problem is accomplished by a device according to Claim 1. The use of a finger actuated rolling means for the scanning of the menus of the telephone set is simple and clear, and in addition, the finger actuated rolling means on the surface of the telephone requires less space than two keys. The finger actuated rolling means could advantageously be a thumb wheel or a thumb ball.

The advantageous embodiments of the invention are presented in the other claims. The invention can be advantageously used in mobile and cellular telephones.

The invention is described in the following with the aid of exemplary embodiments with reference to the appended drawing, in which:

Fig. 1 illustrates a hand-held phone provided with a thumb wheel;

Fig. 2 illustrates a hand-held phone provided with

a thumb ball;

Fig. 3 shows another placement of thumb wheel; Fig. 4 illustrates schematically the device according to the invention which uses a potentiometer to detect the direction and speed of rotation of the thumb wheel;

Fig. 5 shows schematically another embodiment according to the invention which uses optical devices; and

Fig. 6 visualizes the operation of the device in Fig. 5 with the aid of a pulse diagram.

The following description of the exemplary embodiments is based on the assumption that the device according to the invention is situated in a commercially available cellular telephone, whereby the other elements of the telephone are assumed to be known. The present description only handles the essential parts of the telephone, i.e., the arrangement of the finger actuated rolling means and the detecting and transforming elements.

Fig. 1 and 2 show a typical hand-held phone provided with a display D, a key pad as known and a finger actuated rolling means according to the present invention. In Fig. 1 the finger actuated rolling means is a thumb wheel W, and in Fig. 2 such means is a thumb ball. Fig. 3 show an advantageous location especially for the thumb wheel. This placement is ergonomically better because it is easier to actuate with a finger the wheel placed on the side of the phone than the wheel placed on the main surface of the phone.

Now we consider what happens when the finger actuated means is rolled. The following description concerns the thumb wheel, but instead of the wheel we can use the ball as well.

Fig. 4 shows a device in which a known thumb wheel uses helical potentiometer 1 which is coupled thereto. The coupling can be implemented by a known method, for example, by coupling the shafts of the potentiometer and the thumb wheel or thumb ball together. A commensurate direct voltage signal DC to the swiveling position of the finger actuated rolling means is obtained from the tapping of the potentiometer, and it is directed to the detecting and transforming elements which here are implemented by analog/digital converter 2, and the digital control signal coming from there is conducted via a bus to processor 3 which controls the menu.

In the following text the word thumb wheel refers to to the finger actuated means in general.

The user can choose the velocity and direction of the scanning by turning the thumb wheel and thus helical potentiometer 1 to the desired direction and at the desired speed. Consequently, the menu pages output on the display (not described) by processor 3 will switch in the desired manner, i.e., in the desired direction and at the desired speed, and the user can promptly bring into view the desired menu. Such an

operation is natural from the point of view of the user as the movement of the hand is directly converted into a visual function perceptible to the eye. Alternatively, the control signal produced by the thumb wheel can be processed by processor 3, e.g., in order to increase or decrease the scanning speed of the menus in a manner preselected by the user.

The thumb wheel may now be freely placed on the surface of the telephone taking into account the ergonomics. The ergonomics of the cellular telephone improve if the thumb wheel is placed on the side of the telephone set, to be turned literally by the thumb (or finger) of the hand holding the telephone, in the immediate proximity of the function keypad of the telephone. The solution according to the invention saves in the surface area of the telephone since the thumb wheel on the surface of the telephone requires less room than the two prior art keys, especially when the thumb wheel is placed on the side of the telephone.

According to the second embodiment of the invention, a magnetic or capacitive coupling circuit has been arranged between the thumb wheel and the detecting and transforming elements which in the known manner produces signals to the processor via the analog/digital converter. Thus a part of the magnetic/capacitive circuit is arranged on the thumb wheel, which part effects a change in the field while moving with the wheel, which change is detected by the other element coupled to the converter of the magnetic/capacitive circuit.

In the most preferred embodiment the detecting and transforming elements comprise circuit 4-5 which essentially optically detects the movement of the thumb wheel, and which produces digital signals N, S which are conducted to processor 6, as illustrated in Fig. 5. A beam of light generated by a light emitting diode or the like in circuit 4 is reflected or interrupted periodically in a known manner in accordance with the movement of the thumb wheel. Preferably two phototransistors or responsive light detecting devices are arranged to receive the beam of light from the light emitting diode. One transistor produces output signal N which corresponds to the turning speed of the thumb wheel, and the other one produces output signal S which corresponds to the direction of rotation of the thumb wheel. Since the light received is in a pulse form, detecting circuit 5 produces, by a suitable sizing of the circuit, digital signals N and S in its outputs which can be coupled directly to processor 6 without the intermediate analog/digital converter. Those skilled in the art will comprehend that this embodiment consists of a technically simple solution which is also reliable because the number of mechanical parts is small and the electric circuits are simple.

Fig. 6 visualizes schematically control pulses N (velocity) and S (direction) produced by the optical circuit. The pulse sequence on the left in the figure illustrates in the case of pulse N that the thumb wheel is

turned fast, whereby the pulse frequency is high and the pulses short. When the turning speed in the middle and on the right is decreased, the pulse frequency decreases and the pulse length increases. The direction of rotation of the thumb wheel is indicated so that corresponding pulse S is of a fixed length, but the point of occurrence indicates the direction of rotation. In Fig. 3, on the left and in the middle, pulses S occur on the front edge of pulses N when the thumb wheel is turned forward, and pulses S are on the back edge of pulses N, respectively, when the thumb wheel is turned backwards.

Even though this description is based on the assumption that the device according to the invention is used in a cellular telephone, it is clear to those skilled in the art that the inventive idea can be applied to many other equivalent telephone sets.

## Claims

1. A device for scanning the menus of telephone sets comprising essentially a finger actuated rolling means and elements (1, 2; 4, 5) which detect and transform the direction and speed of rotation of the finger actuated rolling means into control signals, which are conducted to the processor (3; 6) controlling the menus of the display.
2. A device according to Claim 1, **characterized** in that the finger actuated rolling means is a thumb wheel.
3. A device according to Claim 1, **characterized** in that the finger actuated rolling means is a thumb ball.
4. A device according to Claim 1, **characterized** in that the detecting and transforming elements essentially comprise a helical potentiometer (1) and an analog/digital converter (2).
5. A device according to Claim 1, **characterized** in that a magnetic or capacitive coupling circuit is arranged between the finger actuated rolling means and the detecting and transforming elements, and that the detecting and transforming elements further comprise an analog/digital converter.
6. A device according to Claim 1, **characterized** in that the detecting and transforming elements essentially comprise a circuit (4-5) which optically detects the movement of the finger actuated rolling means, and which produces digital signals (N, S) which are conducted to the processor (6).
7. A device according to Claim 6, **characterized** in

that the detecting circuit separately detects the speed (N) and the direction of rotation (S) of the finger actuated rolling means.

8. A device according to one of the preceding Claims, **characterized** in that the finger actuated rolling means is arranged on the telephone set in the immediate proximity of the operating keypad. 5
9. A device according to one of the preceding Claims, **characterized** in that the finger actuated rolling means is arranged onto the side of the telephone set to be turned by the finger or thumb of the hand holding the telephone. 10
10. The utilization of the device in a cellular telephone, according to one of the preceding Claims. 15

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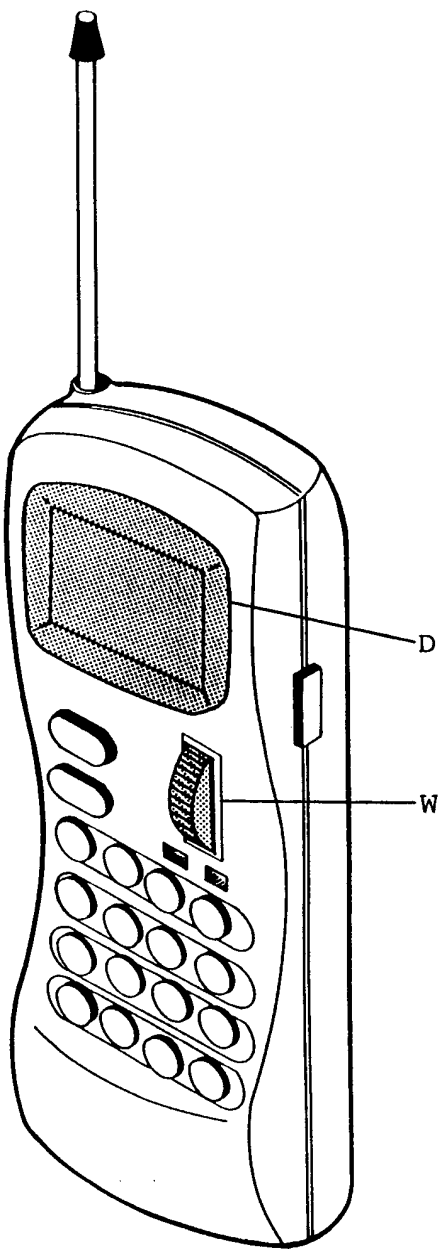


FIG. 1

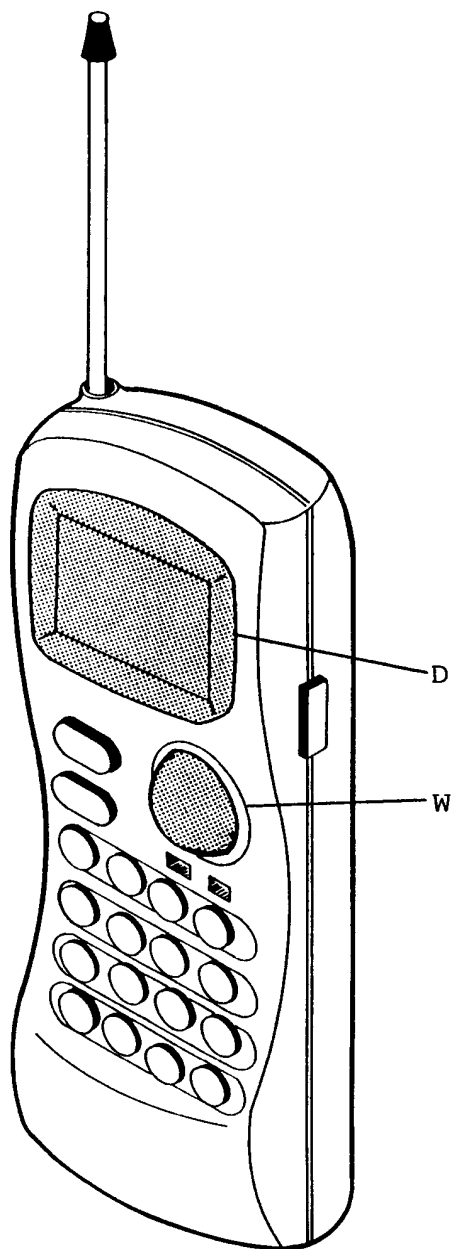


FIG. 2

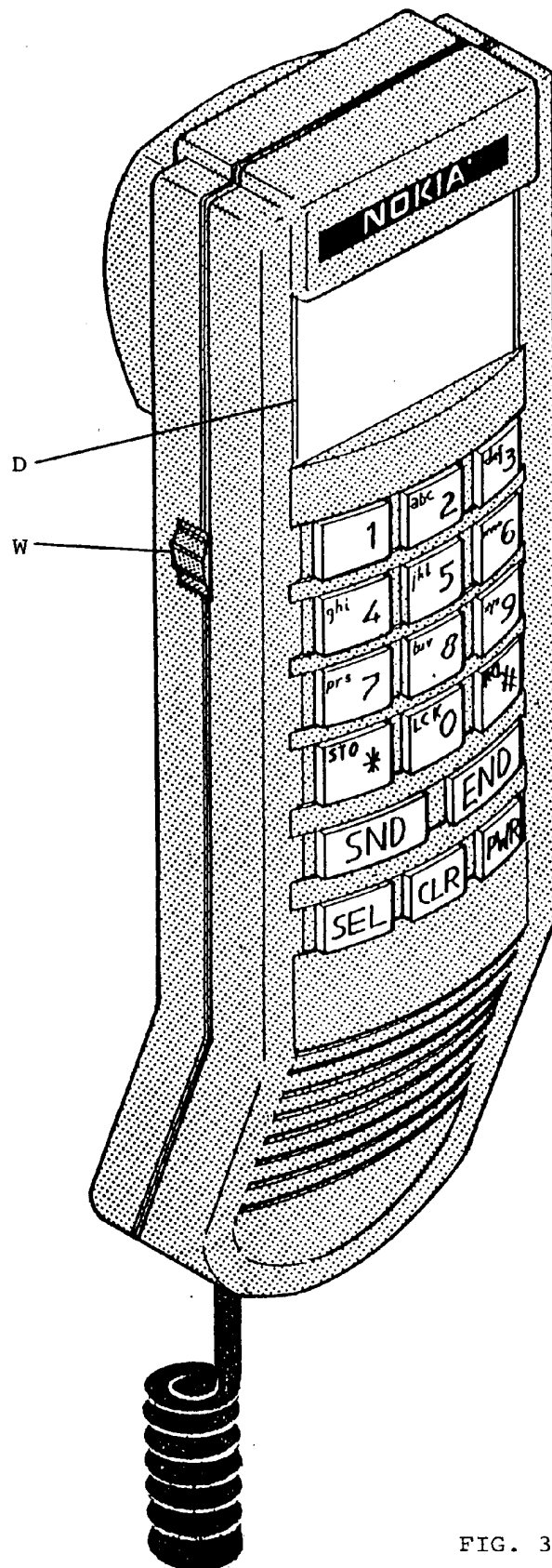


FIG. 3

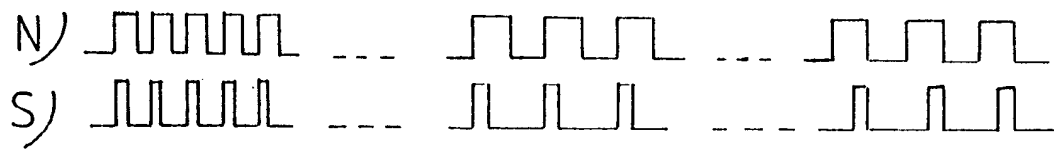
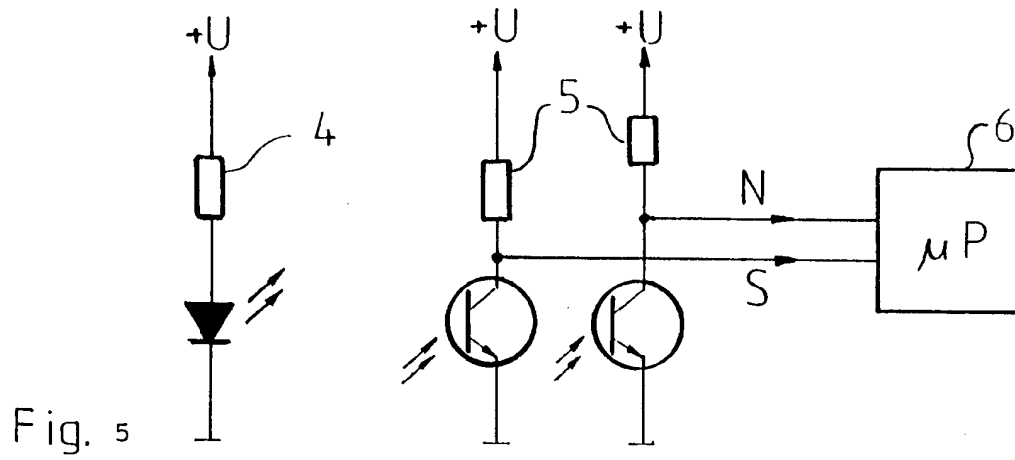
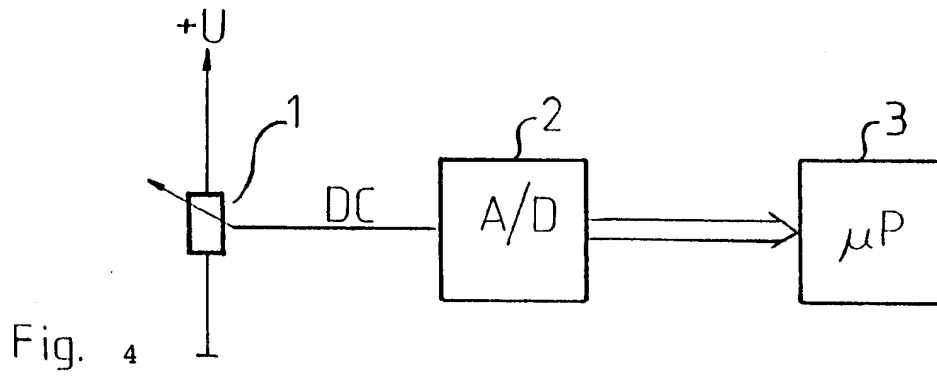


Fig. 6